PROJECT NUMBER: 2501
PROJECT TITLE: Smoke Chemistry
PROJECT LEADER: R. Comes
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PERIOD COVERED: November 1988

I. SIDESTREAM SMOKE

A. Objective: Conduct studies on sidestream smoke including: development of methods for collection and analysis of sidestream gas phase and semivolatiles; visibility determinations; analysis of selected materials relating to sidestream odor and irritation; development of proprietary products.

B. Status: 1.) Methods development for analysis of sidestream smoke components continues. 2.) Construction and testing of instrumentation to monitor visibility of sidestream smoke has been ongoing. 3.) Studies have proceeded using the CORESTA sidestream measurement apparatus in its current state of refinement. Selected samples were run to support this effort.

C. Results: 1.) A second-generation Tekmar desorber has been received. The original model has been reconnected to the valve-operated heart-cutting gc's. Extensive plumbing and pressure-balance work has resulted in a preliminary ability to transfer portions of sidestream gas phase to the second gc column for further separation and identification by mass spectrometry. A second instrument and method has been prepared and developed for analysis of silica gel fractions of semivolatiles of sidestream smoke. This frees the previously used instrument for other work described below. 2.) The 17-port smoking machine has been removed from the conditioned lab. It has been replaced with the 8-port instrument, which has been redesigned, rebuilt, and is undergoing testing. 3.) Control labelled-tobacco cigarettes and balsa-core cigarettes were tested with the CORESTA apparatus. Results from this work are inconclusive and will require additional experiments, possibly using other types of analyses to compare with results obtained to date.

D. Plans: 1.) The currently used Tekmar unit will be exchanged for the new one with the help of the Tekmar service representative. This will permit us to utilize his expertise in installation, and give him a first-hand look at our use of the instrument. The older instrument will then be returned to the factory for retro-fitting with current generation hardware. Additional development work on valve-switched heart-cutting capillary gc will determine whether this is a viable technique for this analysis. If not, pressure-switched heart-cutting will be investigated. The auto-sampler gc will be used to examine semivolatiles from control and experimental, low-sidestream cigarette models. 2.) Improvement of the 8-port smoking apparatus will be continued with the objective of providing a reliable instrument for measurement of visibility of sidestream smoke so that the instrument and method can be duplicated in other labs. 3.) Additional

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experimental work and study of data already gathered will be done to clarify the effect of cigarettes with novel constructions on sidestream delivery.

II. SIDESTREAM SMOKE CHAMBER

A. Objective: Design and construct an environmentally controlled chamber to measure selected components of sidestream smoke.

B. Status: Final authorization of the chamber project has been given. Final specifications for some instruments have been reviewed and they have been ordered. The electronic/computer control and data acquisition capabilities for the chamber are being attended to with the help of the divisions responsible for this portion of the work. Final plans are being prepared by the vendor for construction of the chamber.

C. Results: Cooperative work among responsible parties in R&D and with vendors has moved this project from the planning stage to beginning the assembly and operation of the chamber.

D. Plans: Meet with chamber vendor to review final plans; visit vendor's facility to observe chamber construction; approve final chamber design and authorize construction; request lab modifications including hood installation and other work necessary to accomodate the chamber; bench-test instruments as they are received before installation in chamber; provide hardware and software for data acquisition and archival in database, and for chamber and instrument control.

III. MISCELLANEOUS

Analysis of nicotine/alkaloids is being carried out by capillary gc to support various aspects of the ART project.

Analyses of smoke and extracts of un-burned Premier cigarettes have been done by capillary gc-ms. Identifications of many components in the product and its smoke have been reported by memo. Neutron radiography has also been used to study this product.

The new Finnigan mass spectrometer is operational and familiarization with its use is continuing.

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